Louisville Metro
Multi-Hazards Mitigation Plan

SECTION 4.0 MITIGATION STRATEGY

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4.0 MITIGATION STRATEGY

4.1 Overview for Developing a Mitigation Strategy

The Local Mitigation Plan requirements encourage agencies at all levels, local residents, businesses, and the nonprofit sector to participate in the mitigation planning and implementation process. This broad public participation enables the development of mitigation actions that are supported by these various stakeholders and reflect the needs of the community.

The Mitigation Action Plan responds to the Risk Assessment with projects and activities to mitigate Louisville's natural and man-made hazards. The action plan outlines projects in a five-year plan that allows Louisville Metro to make informed future land use and zoning decisions, design better infrastructure, and keep the public out of harm's way.

Moreover, the updated Plan and Mitigation Strategy provides a proactive, community mitigation program of activities, projects and programs that will help local agencies, residents, and businesses to be better prepared to prevent and/or reduce losses from an identified hazard. Louisville Metro has been very successful to-date with mitigation activities, including regulatory and legislation actions.

Mitigation Strategy

§201.6(c)(3) requires jurisdictions to develop a mitigation strategy.

The mitigation strategy serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy includes the development of goals, objectives, and prioritized mitigation actions. The development of goals from which specific actions and projects will be derived is based on the community's existing authorities, policies, programs, and resources and its capability to use local tools to reduce losses and vulnerability from profiled hazards.

The Mitigation Strategy is specific to exposure and impacts by each hazard and lists prioritized hazard mitigation projects that best meet Louisville's needs for multiple hazard damage reduction. Section 4 outlines the design of the Mitigation Strategy developed through a tier of meetings and coordination with the Advisory Committee. The mitigation strategy is based upon the best available data and provides a blueprint for reducing the potential losses identified in the risk assessments which are the factual basis for the mitigation strategy.

The section reviews the problems and common issues in Louisville Metro and details how the Advisory Committee revised the community's goals and objectives by utilizing a multi-hazard approach. The Louisville Metro's Capability Assessment outlines state and local ordinances, statues and regulations, and reviews funding mechanisms. Ongoing programs are outlined in the section which assisted the Advisory Committee to develop a five-year Action Plan.

The five-year Action Plan responds to the Risk Assessment with projects and activities to mitigate Louisville's natural and man-made hazards. The action plan outlines projects that allow Louisville Metro to make informed future land use and zoning decisions, design better infrastructure, and keep the public out of harm's way. Moreover, the updated Plan and

Mitigation Strategy provides a proactive, community mitigation program of activities, projects and programs that will help local agencies, residents, and businesses to be better prepared to prevent and/or reduce losses from an identified hazard. Louisville Metro has been very successful to-date with mitigation activities, including regulatory and legislation actions.

4.2 State Capability Assessment

To set the stage for a mitigation strategy it is imperative to know the capability of the community to perform mitigation, regulate, and design outreach. Reducing hazards is a priority for Louisville Metro and the Commonwealth of Kentucky. State regulations affect all of Kentucky and each local community is subject to them. However, a community may adopt laws that are even more restrictive.

The following subsections outline hazard mitigation activities listed in the 2010 State Hazard Mitigation Plan that evaluates state regulations, policies, and state-funded or administered programs. Following this description of State capabilities there is a similar section/description of Louisville Metro's capabilities. The intent in listing both the State and Local capabilities is to develop a better understanding of state government activities related to hazard mitigation and their impact on local communities. In addition, an analysis of the regulatory functions with respect to mitigation and hazards planning is imperative to good planning.

Among the best examples of hazard mitigation in State government are the floodplain management program, the dam safety program, and the FEMA-funded State administered hazard mitigation programs. However, a number of other programs, funding sources, executive orders, and interagency agreements have elements that can support or facilitate hazard mitigation. The state's capability is the foundation of similar capabilities by local government. As mentioned, following this section is a detailed discussion of Louisville Metro's capability, regulations, and ordinances.

The following section provides a synopsis of the State Regulatory Analysis. The expanded State Hazard Mitigation Capability Matrix can be found in Appendix 4.1.

4.2.1 State Regulatory Analysis and Funding Summary

4.2.1.1 Kentucky Pre- and Post- Disaster Legislation

The Kentucky General Assembly realizes that the Commonwealth is subject to disasters or emergency occurrences at all times. These instances can range from events affecting limited areas to widespread catastrophic events. Immediate and effective response to these occurrences is a fundamental responsibility of elected government. Therefore, the General Assembly established a statewide comprehensive emergency management system to provide assessment and mitigation of threats to public safety and the negative externalities resulting from all major hazards.

The Kentucky Revised Statutes (KRS) were enacted in 1942 to eliminate provisions no longer in force or effect and to compile the remaining laws into a comprehensible form. In July of 1998, KRS 39A.010 established the Kentucky Division of Emergency Management (KyEM) and local emergency management agencies, replacing Kentucky Disaster and Emergency Services. In addition, the emergency powers provided in KRS Chapter 39A through 39F were conferred

upon the Governor, the county judges/executives, the mayors of cities and urban-county governments, and the chief executives of local governments. Provisions were also established for mutual aid among the cities, counties, and urban-county governments of the Commonwealth.

There are a number of sections in KRS which address the issues of emergency systems, hazard safety, and hazard mitigation. There are several statutes which specifically pertain to pre-disaster mitigation:

- KRS 39 - The KyEM shall coordinate for the Governor all matters pertaining to the comprehensive emergency management program and disaster and emergency response of the Commonwealth. The division shall be the executive branch agency of state government having primary jurisdiction, responsibility, and authority for the planning and execution of disaster and emergency assessment, mitigation, preparedness, response, and recovery for the Commonwealth (KRS 39A.050).

- KRS 147 - Any general fund appropriations made for the Local Match Participation Program may be used for flood control planning and mitigation activities and straight sewage pipe removal and mitigation activities (KRS 147A.029).

- KRS. 149 - There are two official fire hazard seasons as established by the state legislature (KRS. 149.400). The fire seasons run from February 15 - April 30 and October 1- December 15. During the official fire seasons, "it shall be unlawful for any person to set fire to, or procure another to set fire to any flammable material capable of spreading fire, located in or within one hundred fifty (150') of any woodland or brushland, except between the hours of 6:00 p.m. and 6:00 a.m., prevailing local time, or when the ground is covered with snow". Open burning requirements are outlined in 401 KAR 63:005.

- KRS 151 - The Energy and Environment Cabinet shall administer KRS 151 and establish the requirements for obtaining a floodplain development permit (KRS 151.250). The water resources authority shall develop a public information program for use by local units of government which will assist them in the development of floodplain management and flood hazard mitigation programs (KRS 151.600).

- KRS 158 - The board of each local school district, and the governing body of each private and parochial school or school district, shall establish an earthquake and tornado emergency procedure system in every public or private school building in its jurisdiction having a capacity of 50 or more students, or having more than one classroom (KRS 158.163). The earthquake and tornado emergency procedure system shall include, but not be limited to:

    - A school building disaster plan, ready for implementation at any time, for maintaining the safety and care of students and staffs;
    - A drop procedure - an activity by which each student and staff member takes cover under a table or desk, dropping to his or her knees, with the head protected by the arms, and the back to the windows;

  - A safe area - a designated space including an enclosed area with no windows, a basement or the lowest floor using the interior hallway or rooms, or taking shelter under sturdy furniture;
  - Protective measures to be taken before, during, and following an earthquake or tornado;
  - A program to ensure the students and the certificated and classified staff are aware of and properly trained in, the earthquake and tornado emergency procedure system.
- KRS 198B - The Uniform State Building Code (KRS 198B.050) addresses issues concerning seismic and severe wind construction in response to the Commonwealth's potential earthquake and wind threats.
- KRS 211 - The Cabinet for Health Services shall develop and conduct programs for evaluation and control of activities related to radon including laboratory analyses, mitigation, and measurements (KRS 211.855).

In addition to KRS legislation, the following are other initiatives which address state hazard mitigation:

- Jurisdictions which participate in the NFIP have established ordinances related to floodplain development. In addition, as a NFIP community, when purchasing a home located within the boundary of a special flood hazard area (SFHA), the buyer is required to purchase flood insurance.
- Kentucky Drought Mitigation and Response Plan: Prepared by the Energy and Environment Cabinet in partnership with the Kentucky Drought Mitigation and Response Advisory Council. In fulfillment of the directive of Senate Joint Resolution 109, December 31, 2008. This plan provides statewide guidance to assess and minimize the impacts of a drought in Kentucky. This plan serves as a foundation to a proactive drought planning process intended to reduce drought risk in Kentucky. The plan describes a simple collaborative approach to accelerate the decision-making processes of state and federal agencies that are necessary to assist local government efforts in drought response. It establishes a mechanism for these agencies to work together during nondrought years with various agencies and individuals outside of state government to identify mitigation actions that can be taken to reduce the impacts of future droughts.
- Flood Map Modernization in Kentucky: Map Modernization is a cornerstone for helping communities to be better prepared for flood disasters. The NFIP currently serves 4.5 million policyholders and provides $650 billion in coverage nationwide. Kentucky is in the process of updating flood maps statewide with the goal of identifying flood hazards for areas that drain more than 1 square mile (640 acres). It is important to remember that every stream, large or small, has a floodplain and that any downstream structure may be damaged during flooding. The new aerial-photo-base maps will show areas that are likely to be flooded during a 1-percent-annual-chance flood. To accomplish map modernization, KDOW has formed partnerships with the Kentucky Transportation Cabinet (KYTC), Kentucky Division of Geographic Information, Kentucky Division of

Emergency Management (KyEM), U.S. Geological Survey (USGS), Kentucky Council of Area Development Districts (ADDs), and U.S. Army Corps of Engineers (USACE).

The end product of these partnerships will be not only digital floodplain maps, but also information that can be used for homeland security, natural resource conservation, emergency management and transportation purposes in order to promote economic development and maximize mitigation efforts.

The following table analyzes the tools available at this time in the Commonwealth. The table depicts the existing authorities, policies, programs and resources, and how they affect the hazard mitigation process.

STATE AND LOCAL CAPABILITIES ASSESSMENT															
Existing Authorities							Programs				Resources				
Floodplain Management Ordinance	Building Codes	Zoning Regulations	Subdivision Regulations	Fire Prevention Codes (State)	Stormwater Management Plans	Hazardous-Materials Ordinance	NWS Storm Ready Program	Emergency Operations Plan	Community Rating System	Flood Map Modernization	Local Economic Developments	Regional Development Agency	Local Emergency Management Agency	Local Emergency Planning Committee	Kentucky Drought Mitigation and Response Plan

4.2.1.2 Federal Funding and Technical Assistance Sources

Various federal government offer a wide range of funding and technical assistance programs to help with mitigation efforts throughout the State. The table below is a list of Federal Funding and Technical Assistance programs available to states and local communities. The table outlines the funding source, purpose, the hazard mitigation application and contact info.

FEDERAL FUNDING AND TECHNICAL ASSISTANCE PROGRAMS				
Grant Name	**Agency**	**Purpose**	**Hazard Mitigation Application**	**Contact Info**
Emergency Management Performance Grants (EMPG)	Homeland Security	To assist the development, maintenance, and improvement of State and local emergency management capabilities, which are key components of a comprehensive national emergency management system for disasters and emergencies that may result from natural disasters or accidental or man-caused events.	EMPG provides the support that State and local governments need to achieve measurable results in key functional areas of emergency management: 1) Laws and Authorities; 2) Hazard Identification and Risk Assessment; 3) Hazard Management; 4) Resource Management; 5) Planning; 6) Direction, Control, and Coordination; 7) Communications and Warning; 8) Operations and Procedures; 9) Logistics and Facilities; 10) Training; 11) Exercises; 12) Public Education and Information; and 13) Finance and Administration.	Department of Homeland Security, FEMA, c/o 245 Murray Lane - Bldg. #410, Washington, DC 20523. Telephone 800-621-FEMA-(3363). http://www.fema.gov/government/grant/government.shtm#4
Economic Adjustment Assistance	Dept. of Commerce, Economic Development Administration	To address the needs of distressed communities experiencing adverse economic changes that may occur suddenly or over time, and generally result from industrial or corporate restructuring, new Federal laws or requirements, reduction in defense expenditures, depletion of natural resources, or natural disaster.	Project grants can be in response to natural disasters including improvements and reconstruction of public facilities.	Office of Economic Adjustment, Dept. of Defense, 400 Army Navy Drive, Suite 200, Arlington, VA 22202-4704. Telephone: (703) 604-6020.
National Earthquakes Hazards Reduction Program (NEHRP)	FEMA	The NEHRP's premise is that while earthquakes may be inevitable, earthquake-related damages are not. Activities of the program include basic and applied research; technology development & transfer; and training, education, & advocacy for seismic risk reduction measures.	FEMA administers a program of grants and technical assistance to States to increase awareness of earthquake hazards, foster plans, and implement mitigation actions to reduce seismic vulnerability.	Mitigation Division FEMA Region IV 3003 Chamblee-Tucker Rd. Atlanta, GA 30341 Telephone: (770) 220-5200 http://www.fema.gov/plan/prevent/earthquake/nehrp.shtm
Community Assistance Program State Support Services Element (CAP-SSSE)	FEMA	To ensure that the flood loss reduction goals of the NFIP are met, build state and community floodplain management expertise and capability, and leverage state knowledge and expertise in working with their communities.	Provides funding to States to provide technical assistance to communities in the NFIP and to evaluate community performance in implementing NFIP floodplain management activities.	FEMA, U.S. Dept. of Homeland Security 500 C Street SW, Washington, D.C. 20472 Telephone: (800-621-FEMA (3363). http://www.fema.gov/plan/prevent/floodplain/fema_cap-ssse.shtm http://www.fema.gov/government/grant/government.shtm#4

FEDERAL FUNDING AND TECHNICAL ASSISTANCE PROGRAMS				
Grant Name	**Agency**	**Purpose**	**Hazard Mitigation Application**	**Contact Info**
National Flood Insurance Program (NFIP)	FEMA	To enable persons to purchase insurance against physical damage to or loss of buildings and/or contents therein caused by floods, mudslide or flood-related erosion, thereby reducing Federal disaster assistance payments, and to promote wise floodplain management practices in the Nation's flood-prone and mudflow- prone areas.	Enables property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. (States, localities, and individuals)	FEMA, U.S. Dept. of Homeland Security 500 C Street SW, Washington, D.C. 20472 Telephone: (800) 621-FEMA (3362) http://www.fema.gov/government/grant/government.shtm#4 http://www.fema.gov/business/nfip/
Cooperating Technical Partners (CTP) Program Management	FEMA	The purpose of CTP Program Management is to provide, through a Cooperative Agreement with CTPs, a means to support global program management, state Business Plan updates, outreach, and training to state and local officials for Map Modernization and Risk MAP efforts. The Program Management activities do not directly result in production of a new or revised flood hazard map.	Provides funding to CTPs to supplement, not supplant, ongoing flood hazard mapping management efforts by the local, regional, or State agencies.	FEMA, U.S. Dept. of Homeland Security 500 C Street SW, Washington, D.C. 20472 Telephone: (800) 621-FEMA (3362) http://www.fema.gov/plan/prevent/fhm/ctp_main.shtm http://www.fema.gov/government/grant/government.shtm#4
National Dam Safety Program	FEMA	To provide vital support for the improvement of the state dam safety programs that regulates most of the 79,500 dams in the U.S. Dam safety training for state personnel, increase the number of dam inspections, increase the submittal and testing of Emergency Action Plans, more timely review and issuance of permits, improved coordination with state emergency preparedness officials, identification of dams to be repaired or removed, conduct dam safety awareness workshops and creation of dam safety videos and other outreach materials.	Provides financial assistance to the states for strengthening their dam safety programs through grant assistance	FEMA, U.S. Dept. of Homeland Security 500 C Street SW, Washington, D.C. 20472 Telephone: (800) 621-FEMA (3362) http://www.fema.gov/plan/prevent/damfailure/ndsp.shtm http://www.fema.gov/plan/prevent/damfailure/stategrant.shtm http://www.fema.gov/government/grant/government.shtm#4

Five FEMA-Funded Grant Programs

KyEM implements five grant programs that provide funding for the following types of actions and projects.

- Voluntary acquisitions and demolition or elevation of flood-prone structures for conversion to permanent open space
- Voluntary acquisitions and demolition of landslide-prone structures for conversion to open space in perpetuity
- Infrastructure protection measures against windstorms or earthquakes
- Dry flood proofing of commercial property
- Minor structural flood control projects
- Tornado safe rooms and community shelters
- Utility protection measures

Following is a summary of the grant programs.

1. **Flood Mitigation Assistance (FMA) Grant Program**

   The FMA grant program provides funding for cost-effective measures which reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. The FMA program is funded on an annual cycle. Each year the state receives a target allocation of funding for which local communities can apply. The FMA program is funded by FEMA with a funding split of up to 75% of the project funded by federal funds. The remaining 25% must be paid by the local community.

2. **Hazard Mitigation Grant Program (HMGP)**

   Following a Presidential disaster declaration, the HMGP provides funding to the State for projects to reduce damages, losses and suffering in future disasters. The intent of HMGP is to provide a federal, state and local partnership in developing and funding mitigation projects. Funding is available from the FEMA (up to 75% of the project) and State (up to 12% of the project).

3. **Pre-Disaster Mitigation (PDM) Grant Program**

   The PDM provides funds to the State for pre-disaster mitigation planning and the implementation of cost-effective mitigation projects prior to a disaster event. The PDM program is a nationally competitive program. There is no state allocation and no national priority for projects. The PDM program is funded on an annual cycle. The PDM program is funded by FEMA with a funding split of up to 75% of the project funded by federal funds. The remaining 25% must be paid by the local community.

4. **Repetitive Flood Claims (RFC) Grant Program**

   The RFC grant program provides funding to reduce or eliminate the long-term risk of flood damage to structures insured under the NFIP that have had one or more claim payment(s) for flood damages. The long-term goal of the RFC grant program is to reduce or eliminate the number of recurring flood insurance claims, through mitigation activities which are in the best interest of the National Flood Insurance Fund. All RFC grants are eligible for up to 100

percent Federal cost assistance. RFC grants are awarded to Applicants on a nationwide basis without reference to State allocations, quotas, or other formula-based allocations.

5. **Severe Repetitive Loss (SRL) Grant Program**

   The SRL grant program provides funding to reduce or eliminate the long-term risk of flood damage to SRL structures insured under the NFIP. SRL Properties are residential properties that have at least four NFIP claim payments over $5,000 each, when at least two such claims have occurred within any ten-year period, and the cumulative amount of such claims payments exceeds $20,000; or for which at least two separate claims payments have been made with the cumulative amount of the building portion of such claims exceeding the value of the property, when two such claims have occurred within any ten-year period.

FEMA-FUNDED HAZARD MITIGATION ASSISTANCE GRANT PROGRAMS		
FEMA Grant Name	**Purpose**	**Hazard Mitigation Application**
1. FMA Program	To help States and communities plan and carry out activities designed to reduce the risk of flood damage to structures insurable under the NFIP.	The program provides planning, project and technical assistance grants for mitigation activities that are technically feasible and cost effective.
2. HMGP	To prevent future losses of lives and property due to disasters; to implement State or local hazard mitigation plans; to enable mitigation measures to be implemented during immediate recovery from a disaster; and to provide funding for previously identified mitigation measures to benefit the disaster area.	Project grants can be funded for such activities as acquisition, relocation, elevation, and improvements to facilities and properties to withstand future disasters.
3. PDM Program	The PDM program provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations.	Provides funds for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event.
4. RFC Program	Provides funding to States and communities to reduce or eliminate the long-term risk of flood damage to structures insured under the NFIP that have had one or more claims for flood damages, and that cannot meet the requirements of the FMA program for either cost share or capacity to manage the activities.	Up to $10 million is available annually for FEMA to provide RFC funds to assist States and communities reduce flood damages to insured properties that have had one or more claims to the NFIP.
5. SRL Program	Provides funding to reduce or eliminate the long-term risk of flood damage to SRL structures insured under the NFIP.	Eligible flood mitigation project activities include Floodproofing (historical properties only); Relocation; Elevation; Acquisition; Mitigation reconstruction (demolition rebuild); and Minor physical localized flood control projects.

Eligible projects must meet a FEMA-approved benefit-cost analysis, in which the applicant must demonstrate for every dollar spent on a project at least a dollar's worth of future damage protection will be realized. Projects must also meet other criteria. The Kentucky State Clearinghouse, comprised of a group of state regulatory agencies, must review projects to identify any adverse impact on environmental, archeological, and historic resources. These agencies also may provide guidance on permits which must be obtained before the project may proceed or actions the applicant's community must take to reduce the effects on such resources.

4.2.2 Legal Authority of Counties and Cities in Kentucky

Local governments in Kentucky have a wide range of tools available to them for implementing mitigation programs, policies and actions. A hazard mitigation program can utilize any or all of the four broad types of government powers granted by the State of Kentucky, which are (a) Regulation; (b) Acquisition; (c) Taxation; and (d) Spending. Following is a summary of the four broad types.

A. Regulation

General Police Power

Local governments have been granted broad regulatory powers in their jurisdictions. Kentucky Revised Statutes assign general police power to local governments, allowing them to enact and enforce ordinances that define, prohibit, regulate or abate acts, omissions, or conditions detrimental to the health, safety, and welfare of the people, and to define and abate nuisances (including public health nuisances).

Since hazard mitigation can be included under the police power (as protection of public health, safety and welfare), towns, cities and counties may include requirements for hazard mitigation in local ordinances. Local governments may also use their ordinance-making power to abate "nuisances," which could include, by local definition, any activity or condition that threatens the general health and safety of the public.

Louisville Metro has enacted and enforces regulatory ordinances designed to promote the public health, safety, and general welfare of its citizenry.

Building Codes and Building Inspection

Many structural mitigation measures involve constructing and retrofitting homes, businesses, and other structures according to standards designed to make the buildings more resilient to the impacts of natural hazards. Many of these standards are imposed through the use of building codes. Jurisdictions have the opportunity and the power to develop and enforce building codes. Louisville Metro has adopted and enforces a building code, which will be discussed in detail in a later section.

Land Use

Regulatory powers granted by the state to local governments are the most basic manner in which a local government can control the use of its land. Through various land use regulatory powers, a local government can control the amount, timing, density, quality, and location of new development. All these characteristics of growth can determine the level of vulnerability of the community in the event of a natural hazard. Land use regulatory powers include the power to engage in planning, enact, and enforce zoning ordinances, floodplain ordinances, and subdivision controls. Louisville Metro has adopted Cornerstone 2020, the community's comprehensive plan, and the Land Development Code (LDC) that govern land use decisions. Both are discussed in more detail in the next subsection.

Planning

Local jurisdictions have the authority to perform a number of duties related to planning, including: make studies of the area; determine objectives; prepare and adopt plans for achieving those objectives; develop and recommend policies, ordinances, and administrative means to implement plans. The Louisville Metro Planning Commission oversees planning activities. The Louisville Metro Department of Planning and Design Services (PDS) is responsible for overseeing development activities and advises the Planning Commission.

Zoning

Zoning is the traditional and most common tool available to local governments to control the use of land. The statutory purpose for the grant of power is to promote health, safety, morals, or the general welfare of the community. Land "uses" controlled by zoning include the type of use (e.g., residential, commercial, industrial) as well as minimum specifications for use such as lot size, building height and set backs, density of population, etc. The Louisville Metro Development Code is the basis for all zoning decisions in the Metro Area. The Planning and Design Services staff is responsible for review of all zoning cases within Louisville Metro and the Planning Commission makes recommendations on whether or not they should be approved. The Louisville Metro Council is ultimately responsible for approval of all zoning requests except for zoning cases located within the boundaries of cities of the 4th Class and higher. In these cities, the appropriate city council makes the final decision. These cities are: Anchorage, Douglass Hills, Greymoor-Devondale, Hurstbourne, Indian Hills, Jeffersontown, Lyndon, Middletown, Prospect, St. Matthews, St. Regis Park and Shively.

Subdivision Regulations

Subdivision regulations control the division of land into parcels for the purpose of building development or sale. Flood-related subdivision controls typically require that subdividers install adequate drainage facilities and design water and sewer systems to minimize flood damage and contamination. They prohibit the subdivision of land subject to flooding unless flood hazards are overcome through filling or other measures, and they prohibit filling of floodway areas. Subdivision regulations require that subdivision plans be approved prior to the division/sale of land. Subdivision regulations are a more limited tool than zoning and only indirectly affect the type of use made of land or minimum specifications for structures. The Louisville Metro Subdivision Regulations are included in the LDC and discussed in more detail in the next subsection.

Floodplain Ordinance

The purpose of the local floodplain ordinance is to (1) minimize the extent of floods by preventing obstructions that inhibit water flow and increase flood height and damage; (2) prevent and minimize loss of life, injuries, property damage and other losses in flood hazard areas; and (3) promote the public health, safety and welfare of citizens of the jurisdiction in flood hazard areas. The ordinance also makes certain that the community meets the minimum requirements for participation in the NFIP.

The incentive for local governments adopting such ordinances is that they will afford their residents the ability to purchase flood insurance through the NFIP and be eligible for state

Hazard Mitigation funding. Floodplain regulations were adopted in Louisville Metro and are included in the LDC and discussed in more detail in the next subsection.

Louisville Metro is a participant in FEMA's Community Rating System (CRS), which rewards communities that implement projects to mitigate the impacts of flooding with reductions in flood insurance rates. Louisville Metro is currently rated as Class 5, which puts it in the top 5% of communities nationwide. Class 5 results in a 25% reduction in flood insurance rates for homeowners in the floodplain.

Hazardous Materials Ordinance

The Louisville Metro Multi-Hazard Plan five-year update is adding hazardous materials as a man-made hazard. The purpose of the Louisville Metro Hazardous Materials Ordinance (HMO) is for the protection of public health and safety through the prevention and control of hazardous materials incidents and releases and requires the timely reporting of releases. It applies to all parties who manufacture, use or store hazardous materials in quantities prescribed by the ordinance. The ordinance will be discussed in more detail.

B. Acquisition

The power of acquisition can be a useful tool for pursuing local mitigation goals. For example, local governments may find the most effective method for completely "hazard-proofing" a particular piece of property or area is to acquire the property (either in fee or a lesser interest, such as an easement), thus removing the property from the private market and eliminating or reducing the possibility of inappropriate development occurring. The state of Kentucky legislation empowers cities, towns, counties, and other government entities, such as the MSD and Louisville Water Company to acquire property for public purpose.

C. Taxation

The power to levy taxes and special assessments is an important tool delegated to local governments by the State of Kentucky. The power of taxation extends beyond merely the collection of revenue, and can have a profound impact on the pattern of development in the community.

Local governments can also raise funds through the implementation of special fees. One fee in particular which has relevance to hazard mitigation is the Stormwater User Fee implemented by MSD in January 1987. This fee is charged to all property owners within the MSD Service Area and is based on the amount of impervious surface on developed property. The money generated by this fee (over $31.7 million in FY 2010) is used for flood protection, drainage maintenance, capital projects, and administration of the community's stormwater management program.

D. Spending

The fourth major power that has been delegated from the Kentucky General Assembly to local governments is the power to make expenditures in the public interest. Hazard mitigation principles can be made a routine part of all spending decisions made by the local government, including the adoption of annual budgets.

4.3 Louisville Metro Capability Assessment Overview

Most residents of Louisville Metro have a general knowledge about the potential hazards that their community faces. However, residents have had little education concerning mitigation actions that increase or decrease the communities' vulnerability to certain hazards. Education concerning mitigation strategies and potential losses are a key factor for Louisville Metro's mitigation strategy.

Because of the Louisville area's history with natural disasters in the past 10 years, it is expected that there is generalized support for advancing hazard mitigation strategies. Louisville Metro has attended and participated in the mitigation planning process, largely due to the fact that the community has been widely affected by these natural disasters.

Louisville's 2005 Action Plan recommended mitigation projects that could be implemented through existing programs and integrated into job descriptions, comprehensive plans, capital improvement plans, zoning and building codes, permitting, and other planning tools, where appropriate. Fortunately, many of the agencies who are implementing the Action Plan are members of the Advisory Committee. The 2011 Action Plan follows suit with incorporating existing planning mechanisms.

4.3.1 Incorporation into Existing Planning Mechanisms

The updated Plan includes documentation that existing plans, studies, reports, and technical information are reviewed and incorporated. The 2007 and 2010 Kentucky State Hazard Mitigation Plan were invaluable and were reviewed and incorporated, as appropriate. Project Staff also reviewed all materials and incorporated them into the updated Plan, as appropriate. Material includes existing mitigation activities, GIS data, studies, plans, ordinances, land use regulations, and any available technical information.

Local Tools

Communities are encouraged to develop actions that can be implemented by using local tools, such as capital improvement budgets, special district funds, or implementing changes in ordinances, policies, or procedures. In addition, communities are encouraged to consider mitigation actions that may not be currently feasible, but may become a realistic possibility following a disaster event. Access to State or Federal funds may enable communities to accomplish actions during post-disaster recovery.

Project Staff requested agencies/organizations to review common problems, development policies, mitigation strategies, and inconsistencies and conflicts in policies, plans, programs, and regulations. Examples of existing local studies/plans include: information from USACE, CRS, NFIP, HMGP, development plans, floodplain management plan, comprehensive and capital improvement plans, watershed plans, EOC plans, transportation plans, and academic reports. Project Staff also talked to experts from federal, state, and local agencies and universities to ensure all available information was reviewed.

Both the State Capabilities Assessment Matrix outlined in the previous section (including Appendix 4.1) and the Local Code Summary below demonstrate the local planning mechanisms available for incorporating the requirements of the hazard mitigation plan. The following Code Summary chart shows the relationship between the local development regulations and the Louisville Metro identified hazards.

LOUISVILLE METRO CODE SUMMARY	Dam Failure	Drought	Earthquake	Extreme Heat	Flood	Hailstorms	Haz-Mat	Karst/Sinkhole	Landslide	Severe Storm: Wind	Severe Winter Storm	Tornado	Wildfire
Cornerstone 2020	N	N	N	N	Y	N	Y	Y	Y	N	N	Y	Y
Land Development Code	N	N	N	N	Y	N	Y	YP	YP	N	N	Y	YP
Floodplain Management Ordinance	N	N	N	N	YP	N	Y	N	N	N	N	N	N
Building Code	N	N	YP	Y	Y	YP	N	Y	Y	YP	YP	YP	N
Residential Code	N	N	YP	Y	Y	YP	N	Y	Y	YP	YP	YP	N
Hazardous Materials Ordinance	N	N	N	N	N	N	YP	N	N	N	N	N	N

"**Y**" means that the regulation addresses at least partially the identified hazard
"**YP**" means that the regulation is the primary one for that hazard
"**N**" means that the regulation does not currently address the hazard

The following subsections provide a synopsis of regulations, land use plans, and authorities for Louisville Metro:

- Cornerstone 2020
- Land Development Code
- Floodplain Management Ordinance
- Building Code
- Residential Code
- Hazardous Materials Ordinance

For a detailed summary, see Appendix 4.2 Louisville Metro Existing Plans, Studies, Reports, and Technical Information. See Section 4.4.1 (Local Agency/Organizations Mitigation Capabilities, On-Going Projects & Success Stories) for details on how Louisville Metro has incorporated programs, projects, and regulations that also includes mitigation success stories.

4.3.1.1 Cornerstone 2020

Comprehensive Plan

Cornerstone 2020 is the official title of Louisville Metro's Comprehensive Plan that was adopted on June 15, 2000 by the Louisville and Jefferson County (now Louisville Metro) Planning Commission. The effective date of the plan was June 16, 2000.

KRS Chapter 100 authorizes local governments to regulate the use and development of land only after the adoption of a Comprehensive Plan, which establishes the goals, and public

policies that define the governmental interest in such regulations. KRS 100 provides for a method of development of the Comprehensive Plan and prescribes that the Plan should be based on research and analysis of the community including:

1. The general distribution of past and present population and a forecast of the extent and character of future population;
2. An economic survey and analysis of the major existing public and private business activities and a forecast of future economic levels, and;
3. The nature, extent, adequacy and the needs of the community for the existing land and building use, transportation, and community facilities in terms of their general location, character and extent.

In addition to the required research component, KRS100 requires the plan to include a statement of goals and objectives and at least three plan elements: a community facilities plan element, a transportation element and a land use element. After the completion of the research and analytical work, the Planning Commission during 1996 drafted and submitted to Jefferson County and the cities within the County with zoning authority (including Louisville) a Statement of Goals and Objectives for the new Comprehensive Plan. The legislative bodies studied and adopted the goals and objectives during 1997. Two jurisdictions, Anchorage and the City of Louisville, modified the Goals and Objective originally adopted by the Planning Commission in 1996. The Planning Commission on February 19, 1998 then adopted the revised Goals and Objectives.

The final phase of the adoption of Cornerstone 2020 was the publication and adoption of the Plan Elements. These were developed and drafted to implement the goals and objectives and were the product of an extensive public review process. The draft document was the subject of a public hearing on September 30, 1999. The Planning Commission accepted the revised version of the plan elements and forwarded it to the legislative bodies for review and adoption. All 13 legislative bodies with zoning powers adopted the plan elements, which were officially adopted by the Planning Commission on June 15, 2000 as a component of the overall Cornerstone 2020 Comprehensive Plan.

Besides the three statutorily required plan elements, namely Community Form/Land Use (Guidelines 1-5), Mobility/Transportation (Guidelines 7-9), and Community Facilities (Guidelines 14 and 15) the Comprehensive Plan contains two additional plan elements, Marketplace (Guideline 6) and Livability/Environment (Guidelines 10-13). The 15 guidelines are to be used for the assessment of proposed amendments to the Zoning District Map, Land Development Code text and the Community Form Core Graphics. They are to be regarded as fundamental planning statements and are intended to be read and applied in an interrelated manner and in conjunction with the Goals and Objectives to determine whether a proposed land use change is in agreement with the Comprehensive Plan.

4.3.1.2 Land Development Code Summary

The “Land Development Code for all of Jefferson County, Kentucky” (LDC) was adopted by the Louisville Metro Planning Commission, pursuant to KRS 100.137, and became effective in March 2003. The current LDC also includes subsequently adopted ordinances. It provides the detailed regulations for all development in Louisville Metro in conformance with the Comprehensive Plan (Cornerstone 2020). Under the LDC, Louisville Metro is vested with

zoning authority for all areas of the County except for properties located within the boundary of 2nd, 3rd, and 4th Class Cities. The cities which retain zoning authority are: Anchorage, Douglass Hills, Graymoor-Devondale, Hurstbourne, Indian Hills, Jeffersontown, Lyndon, Middletown, Prospect, Shively, St. Matthews, and St. Regis Park. The Louisville Metro Planning Commission reviews and makes recommendations to the cities on development proposals using the LDC and Cornerstone 2020 as a guideline. All of the cities also utilize the Cornerstone 2020 as their guideline for reviewing development proposals; however, as of October 2010, three cities (Anchorage, St. Matthews, and Indian Hills) are still using the Development Code that was in effect prior to March 2003.

The LDC provides for government agency review of development plans utilizing the regulations and guidelines of the LDC in their review and approval. Agencies involved in the review of development plans include:

- Metro Planning and Design Services staff
- MSD (drainage, floodplain management, sewers, slopes, unstable soils, karst, erosion and sediment control, hazardous materials etc.)
- Inspections, Permits and Licenses (IPL)
- Public Works
- Public Health Department
- Fire Departments
- Police Departments
- Natural Resources Conservation Service (soils, slopes, etc.)
- Air Pollution Control District (APCD)
- Other agencies depending on type and location of development such as the Waterfront Development Corporation, USACE, KIPDA, TARC, and Historic Preservation.

Following are specific sections of the LDC which relate to natural hazards.

Zoning Districts

W-1 – Waterfront District (flooding)
W-2 – Waterfront District (flooding)
W-3 – Waterfront District (flooding)
WRO – Waterfront Development Review Overlay District (flooding)

Chapter 3 Special Districts

Part 1. Floyds Fork Special District – New regulations are to be drafted but until then, the 1993 Floyds Fork Development Review Overlay District regulations are still in effect. The regulations provide special protection for the stream corridor to protect the quality of the natural environment. Sections with specific higher standards include:

- Stream Corridors
- Trees and Vegetation

- Drainage and Water Quality
- Hillsides
- Historic Elements
- Vistas and Appearance

Part 2. Jefferson Forest Special District – New regulations to be developed.

Part 3. Ohio River Corridor Special District – New regulations to be developed.

Part 4. Tyler Rural Settlement Special District – New regulations to be developed.

Appendix 3A Bardstown Road/Baxter Avenue Corridor Review Overlay District – Although the regulations do not specifically discuss hazards, historic preservation is strengthened in the district which could affect earthquake vulnerability particularly regarding façade preservation.

Appendix 3B Downtown Overlay District – Regulations do not specifically address hazards except potentially in Section E "Waterfront View District".

Appendix 3C Waterfront Review Overlay District – Adopted pursuant to KRS 82.660 – 82.670, the regulations require higher level review of all development within the defined area and provide for a separate review process by the Waterfront Development Corporation, the agency responsible for development of the waterfront area. Besides flooding there is one other hazard addressed by section 162.48 Design Guidelines (7) which requires all utilities to be underground (wind, tornado).

4.3.1.3 Louisville Metro Floodplain Regulations

NFIP Compliance

All Local Mitigation Plans approved by FEMA after October 1, 2008 must describe the jurisdiction's participation in the NFIP and must identify, analyze and prioritize actions related to continued compliance with the NFIP. Participation in the NFIP is based on an agreement between communities and FEMA. The NFIP has three basic aspects: 1) floodplain identification and mapping; 2) floodplain management; and 3) flood insurance.

NFIP Compliance
Requirement §201.6(c)(3)(ii)

[The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

NFIP participation requires community adoption of flood maps. Mapping flood hazards creates broad-based awareness of the flood hazards and provides the data needed to administer floodplain management programs and to actuarially rate new construction for flood insurance. To be a participant, the NFIP requires communities to adopt and enforce minimum floodplain management regulations that help mitigate the effects of flooding on new and improved structures. Community participation in the NFIP enables property owners to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages.

Louisville Metro's compliance NFIP actions include adoption and enforcement of floodplain management requirements, including regulating all new and substantially improved construction

in Special Flood Hazard Areas (SFHAs) and floodplain identification and mapping, including any local requests for map updates.

Floodplain Management Ordinance

The Louisville Metro area originally joined the NFIP in the late 1970s. FEMA identified five areas within Jefferson County and assigned Community IDs (CID) to:

- City of Jeffersontown, CID #210121 with a Post-FIRM date of 3/5/76
- City of Louisville, CID #210122, 7/17/78
- City of Shively, CID #210124, 8/1/78
- City of St. Matthews, CID #210123, 3/5/76
- Unincorporated Jefferson County, CID #210120, 4/16/79

In 2006, as part of the adoption of a new Flood Insurance Study (FIS), FEMA recognized the new Louisville Metro government structure and assigned one Community ID, 210120 to the entire Louisville Metro area.

The Post-FIRM (Flood Insurance Rate Map) date refers to when the community first adopted floodplain regulations and the FIRM's for that community. The Corps of Engineers developed the original floodplain maps for FEMA in the early 1970s and covered only the area within each of the jurisdictions. They were prepared using different map scales and were difficult to use particularly for properties located on or near the borders of the maps. The maps were updated in 1994 by the Corps in partnership with Jefferson County, LOJIC, and MSD utilizing the then new LOJIC mapping for the county and some new hydrologic and hydraulic models developed by MSD. The maps were the first approved by FEMA that were based on a local community's digital base maps. In December of 2006 revised maps for Louisville Metro developed by MSD under a grant from FEMA as part of the CTP program were approved and adopted.

The Floodplain Ordinance for Jefferson County was originally adopted in 1978 as Article 13 of the Development Code and basically met the minimum FEMA requirements (except it included a 1' freeboard requirement). The ordinance was also adopted by the four cities affected within the County. The Water Management Division of the County Public Works Department was designated as the review and approval agency for all development in the floodplain in the County (including the four cities). A separate floodplain permit was not issued at that time. Instead, Water Management approved plans and those plans became part of the building permit issued by the County or the City. Enforcement was done by the agency issuing the building permit in cooperation with Water Management. On January 1, 1987 MSD was designated the review and approval agency as part of the new stormwater management program implemented by MSD, the County and the City of Louisville. MSD continued enforcement using the process in place at that time.

The Floodplain Ordinance was revised in 1989 in order to meet new FEMA requirements and also to reflect MSD's new role in the enforcement process. The new ordinance exceeded the FEMA minimum in several areas including the 1' freeboard and a requirement to base the substantial damage/improvement calculations on the cumulative cost over the life of the structure. Jefferson County and the City of Louisville joined the CRS at that time. Based on the higher regulatory standards and other programs implemented Louisville Metro is a Class 5 CRS

community. This provides a 25% discount for flood insurance for properties located within the 100-year floodplain.

On September 9, 1997 Jefferson County adopted Ordinance #23, Series 1997, Chapter 157 of the Jefferson County Code of Ordinances. The ordinance was the result of a community wide effort to strengthen the floodplain regulations as a result of the impact of past flooding events. In particular, the flood of March 1997 was fresh in the minds of the community when the ordinance was adopted. Besides strengthening the regulations in several important areas, the new ordinance created a floodplain permit process administered by MSD and a Floodplain Board (the MSD Board) to oversee the process. MSD staff now reviews all development plans in the floodplain, issues a specific floodplain permit and enforces the provisions of the ordinance. The Floodplain Board is responsible for enforcement and requests for appeals and variances. Appeals to the Floodplain Board's actions are to Jefferson County Circuit Court. Penalties for violation were also increased from the previous versions of the ordinance.

As part of the Floodplain Management Plan program, the local task force worked with MSD staff and the Jefferson County Attorney's office to revise the 1997 ordinance to reflect the merger of the City and County and also to implement several changes intended to enhance the enforcement process. The revised Louisville-Jefferson County Metro Government Floodplain Management ordinance (Ordinance No. 125, Series 2005) was adopted by the Metro Council in December 2006.

It should be noted that under the State Regulations, KAR 4:060, a separate state stream construction permit is also required for all development in the floodplain. Since the Louisville Metro ordinance is stricter than the state regulations, the local permit is enforced, but the state permit must also be obtained. MSD staff and the State Division of Water have implemented a process to speed up permit approvals.

4.3.1.4 Building Codes

The currently adopted building codes effective in Louisville Metro are the 2007 Kentucky Building Code and the 2007 Kentucky Residential Code. These codes were promulgated under the Kentucky Administrative Regulations (KAR), 815 KAR 7:120 and 125, under authority of Kentucky Revised Statutes (KRS), KRS 198B.060. They are essentially the same codes as the 2006 International Building & Residential Codes modified to reference specific Kentucky conditions. The Kentucky Building Code was originally approved in 1978 and was adopted by the City of Louisville and Jefferson County in 1980 in accordance with State law. The Kentucky Building Code and Residential Code were officially re-adopted by Louisville Metro on August 12, 2004 and is Section 150.001 – .003 of the Louisville Metro Code of Ordinances.

Enforcement of the building code is the responsibility of the Louisville Metro Department of Codes and Regulations (C&R), Inspections, Permits and Licenses (IPL) Division. This department was created in 2007 by the merger of the Department of IPL and the Department of Planning and Design. C&R's Division of IPL is responsible for plan review, permitting and inspections throughout Louisville Metro except for the City of Jeffersontown which has a Building Department and issues its own permits. The City of Jeffersontown has also adopted and enforces the 2007 Kentucky Building Code and Residential Code.

One very important change to the KY Residential Code which was recommended as part of the 2005 Louisville Metro All Hazard Mitigation Plan involves new requirements to strengthen the connection between the roof and walls of new construction which increases the building's resistance to wind/tornado hazards. This change to Chapter 8 of the Residential Code was approved by the Kentucky Board of Housing & Building Construction and adopted in July 2007.

4.3.1.5 Louisville Metro Hazardous Materials Ordinance

The current Louisville Metro HMO was approved on July 2, 2007 as Ordinance No. 121, Series 2007 which amended and re-enacted Chapter 95 of the Louisville Metro Code of Ordinances. The purpose of the ordinance is for the protection of public health and safety through the prevention and control of hazardous materials incidents and releases and to require the timely reporting of releases. The Louisville and Jefferson County MSD was designated as the lead agency in administering the ordinance.

Haz-mat issues were recognized as being serious to the community many years ago but a series of major events in the late 1970s and early 80s, including the February 13, 1981 Old Louisville sewer explosion, heightened the awareness of the government and citizens to critical levels. It was recognized that in an industrial community hazardous materials can be found almost anywhere and releases of the materials into the environment can be deadly events. These releases can occur at almost any time, but in conjunction with another natural disaster such as a flood or earthquake the damages can multiply exponentially. Because of this, it was decided to add haz-mat to the list of hazards to be addressed as part of the Louisville Metro Multi-Hazard Plan during this five-year update.

4.4 Developing Local Mitigation

Since the 2005 Plan approval, Louisville Metro has suffered multiple disasters and has learned lessons about response, recovery, and mitigation. As a result of these disasters and lessons-learned, the Mitigation Strategy is clearly defined in the updated Plan and identifies and analyzes a comprehensive range of specific mitigation actions and projects to be considered to reduce the effects of each hazard. Particular emphasis is placed on new and existing buildings and infrastructure.

Following is a synopsis of the disasters that Louisville Metro was susceptible to between 2005 – 2010 where lessons were learned about response, recovery, and mitigation. These events were clearly defined in the annual Progress Report and the Advisory Committee did meet after the Presidentially Declared disasters to share After-Action reports. The 2006 – 2009 Progress Reports are available for review on EMA's website.

- **August 2005** – after Hurricane Katrina hit the Gulf Coast, Advisory Committee members approached the local mitigation plan with new eyes. Consequently, during two following meetings, the Advisory Committee brainstormed ideas and methods for changing the Action Plan to be more realistic and viable. The first reorganization was to group several weather-related hazards into a wind/storm-driven category. The wind/storm driven hazards are: Tornado, Winter Storm, Thunderstorm, Hailstorm, and Lightning.

- **September 2006** – After the September flood, MSD gave a presentation on the rain event that caused over $1.5 million in damage to structures.

- **February 2008** – In early February, there were winter tornadoes and lightening. By February 12, Louisville received record snow.
- **March 2008** – Flooding. A flood on the Ohio River covered local roads and caused damage to low-lying areas and structures.
- **April 18 2008** – Earthquake. The magnitude 5.2 earthquake occurred and was centered about 38 miles north-northwest of Evansville, IN. Classified as "moderate," the event caused some damage and was followed by aftershocks, the largest a M4.6.
- **September 14, 2008** – Windstorm. The largest windstorm since the 1974 tornado caused by a Tropical Depression from Hurricane Ike hit the area with 80-mile an hour winds. . Major Disaster Declaration number DR 1802 was declared on October 09, 2008.
- **January 27-28, 2009** –a record ice storm. . In total, 101 out of 120 counties were declared a state of emergency and the President issued a Presidential Disaster Declaration on February 5 (DR 1818).
- **August 4, 2009** – up to 7 ½" of rain flooded portions of Louisville Metro in just over a one-hour time span. A Federal Disaster Declaration for Kentucky Severe Storms, Straight-line Winds, and Flooding was issued on August 14, 2009 (DR 1855).
- **October 2010** – A drought declaration was issued for 50 counties; Louisville Metro was a part of the Commonwealth's Drought Declaration.

4.4.1 Local Agency/Organizations Mitigation Capabilities, On-Going Projects & Success Stories

4.4.1.1 Local Agency/Organizations Mitigation Capabilities

Before initiating the process of setting or revising goals and objectives, the Project Staff requested the stakeholders have the first word on Louisville's potential to mitigate hazards. In order to understand the comprehensive nature of the agencies involved and to educate others about the mitigation projects and programs already in place, the Project Staff asked each member agency /organization to give an overview of their programs and projects.

As a result, participants made 15 presentations during three Advisory Committee meetings on September 15, October 19, and November 16, 2010. The presentations gave each member of the Plan Development Team a sense of the types of mitigation projects currently implemented and set the stage for partnerships. Moreover, members left the meetings with a better understanding of what Louisville Metro is capable of and a vision for projects and programs for Louisville Metro.

Presentations from Local Agency/Organizations are listed below. The presentations focused on Ongoing Mitigation Programs to Prepare, Respond, Recover, Rebuild & Plan and the agency/organizations future plans for mitigation.

Agency/Organization	Presenters
• KyEM Division 6	Mike Dossett
• National Weather Service	Joe Sullivan
• LG&E	Keith Alexander
• LOJIC	Curt Bynum
• Haz-Mat	Jim Bottom, EMA
• MetroSafe	Mindy Glenn, EMA
• Louisville Metro Government Public Works: Snow Plan	Andrew Metcalf
• Louisville Metro Public Health and Wellness	Steve Hosch/Bill Wetter
• American Red Cross	Christy Weaver
• Hospital Planning and Mitigation	Lana Lynch, EMA
○ Medical Reserve Corp.	
• Jewish Hospital & St. Mary Elizabeth Hospital	Steve French
• U of L Mitigation projects	Josh Human
• MSD Mitigation projects	Justin Gray
• How VOAD Works	Jim Garrett, KyEM
• FEMA Grant Applications Summary To-Date	Jim McKinney, EMA

4.4.1.2 Ongoing Programs

As the ongoing programs are monitored, updated, and evaluated, the mitigation strategy outlined in this Plan can be incorporated into these programs. As a result, a comprehensive mitigation strategy will better prepare Louisville Metro for all hazards. Example Louisville Metro's emergency and mitigation program activities listed below demonstrate the ongoing efforts to mitigate the effects of multi-hazards in Louisville Metro.

MSD and USACE projects. MSD has a long, established history of a partnership with the Louisville District Army Corps of Engineers. MSD has worked with the Army Corps of Engineers on floodplain modeling, Flood Insurance Studies (FIS), greenway projects, flood storage programs, and wetlands banking programs. Following are samples of projects with the USACE:

- Pond Creek Flood Protection Project – Project consists of two major sidesaddle detention basins, widening of Northern Ditch and Pond Creek and 15 acres of wetland mitigation.

- South Fork Beargrass Creek Flood Protection Project – All construction is completed on the eight detention basins, channel widening near Newburg Road and the floodwall/levee at Willowbrook Apartments. The Operations and Maintenance (O&M) Manuals have been turned over to MSD.

- Southwest Louisville Flood Protection Project – This project is evaluating the feasibility of constructing backflow prevention devices in affected homes or at the right-of-way to prevent flooding of basements in the combined sewer system area. Also studied was the feasibility of constructing major detention facilities in this same area to retain

potential floodwaters. However, it was determined that the basins were not cost effective as stand-alone flood prevention alternatives.

Project alternatives now include only the use of backflow prevention devices in combination with detention facilities to offset the loss of floodplain storage within the basements. Part of the project will be to ascertain how more "voluntary" participation can be attained or if it will be made mandatory. As part of this voluntary participation, best management practices such as dry wells, rain barrels, and other low impact development alternatives will be studied to reduce direct runoff into the sewer systems. Eventually, this project will be funded as part of MSD's Wet Weather Consent Decree.

- Upper Mill Creek Flood Protection Project – A Feasibility Study cost sharing agreement was completed in 2005. This study is evaluating possible flood control basins and channel improvements in the Upper Mill Creek watershed. If a feasible alternative is identified, MSD and the Corps will pursue a cost-sharing agreement for the remaining design and construction.

Cooperating Technical Partners Program (CTP) – FEMA's innovative CTP has the main objective of increasing local involvement in the flood mapping process. The CTP encourages collaboration with NFIP communities and regional and State agencies who wish to become more active participants in the FEMA flood hazard mapping program.

RiskMAP – As a CTP, the Louisville Metro 2011 RiskMAP project will include updating floodplain modeling for approximately 224 miles of streams within Jefferson County. Updated DFIRMs and an updated FIS will be produced and will replace the current effective DFIRMs and FIS. Wherever possible, existing approximate study areas will be replaced with detailed and limited detailed studies in order to have more accurate information available for the community. Preliminary maps are expected in the summer of 2012, with the final maps approved in the fall of 2013. Included in the RiskMAP requirements will be the certification of the Louisville Metro levee/floodwall system to protect against the 1% annual-chance flood.

Jefferson County Geodetic Control Network –.LOJIC has established a local network of 273 first-order horizontal/vertical control monuments throughout Jefferson County. The local control network is annually maintained in order to verify existing control, reset disturbed monuments and further densify the control network.

To accomplish the goal of providing user-friendly public access to the geodetic control network databases, descriptions and photos, LOJIC developed an interactive web-based map using LOJIC GIS data and ESRI's ArcIMS software. It uses existing LOJIC orthoimagery as its base map along with street names and control monuments, which are displayed in the map view. Users can navigate and zoom into an area of interest by entering an address, street intersection, property parcel number or a specific control monument. A simple site map may also be created from the map view and an on-line help tool is always accessible.

LOJIC on Metro TV

In April 2007 Louisville Metro TV produced a 13-minute Metro Edition feature entitled "Inside Look: LOJIC" that highlights our community's variety of uses of our shared LOJIC GIS.

In November 2008 Louisville Metro TV produced a 15-minute Metro Edition feature with District 11 Councilman Kevin Kramer highlighting the array of interactive LOJIC maps available from the LOJIC website at www.lojic.org.

See http://www.louisvilleky.gov/metrotv for complete MetroTV program schedules.

Louisville Metro Snow Team: Louisville Metro Public Works, Solid Waste Management Services, Metro Parks, and MSD clear 1,362 miles of road in Louisville. The Commonwealth of Kentucky is responsible for clearing the interstates, expressways and highways. As part of an agreement with the Kentucky Transportation Cabinet (KYTC), Louisville crews now maintain most state roads and highways in Louisville. More brine routes have been added - from 700 miles to more than 900 miles, except for interstates. LOJIC and Metro Public Works have created an interactive snow routes map that allows citizens to enter their address to see the current information on the routes being cleared during a snow or ice event. The Snow Routes Map is available on LOJIC's website at: http://www.lojic.org/snow/viewer.htm.

Severe Storms and Earthquake Preparedness program: each year the State of Kentucky has two months set aside for local communities to participate in Severe Storms and Earthquake Preparedness activities. The Louisville Metro EMA compiles a calendar of events for both preparedness programs. Local activities include a comprehensive outreach program and a drill at one or more local and private schools caps off the month-long activities.

National Weather Service (NWS) – NWS has several programs in the Louisville Metro area. The NWS' website for Louisville is at: http://www.crh.noaa.gov/lmk/.

- *One-Hour Reporting Stream Gauges* – The NWS placed all one-hour reporting Louisville Metro stream gauges on its Advanced Hydrologic Prediction Service webpage. While not truly real-time, these gauges allow residents and officials to check stream levels within the current hour. In addition, by clicking on a desired location, it is easy to see how quickly the streams are rising or falling. On-going efforts from the NWS and USGS are determining the critical levels at which flooding of structures and roads begin. Below are the NWS' Advanced Hydrologic Prediction Service links to McAlpine Dam.

  Upper gauge: http://www.crh.noaa.gov/ahps2/hydrograph.php?wfo=lmk&gage=mluk2
  Lower gauge: http://www.crh.noaa.gov/ahps2/hydrograph.php?wfo=lmk&gage=mlpk2
  Click on the "River at a Glance" link.

- *CoCoRaHS* – NWS assisted in the initiation of "Community Collaborative Rain, Hail & Snow" (CoCoRaHS) in Kentucky where volunteers work together to measure precipitation across the nation.
- *Promote "Turn Around and Don't Drown"* (NWS Video) – NWS promotes this initiative, and will make the video/CD available to MetroTV, as well as other media outlets.
- *Tornado Weather Spotter Program*: the National Weather Service sponsors The Weather Spotter program. The Emergency Management staff coordinates with the NWS to train various groups around the community to become Weather Spotters. These trained people are the local eyes and help the NWS warn the public of possible severe weather.

EMA: The following various EMA programs are detailed on their website at: http://www.louisvilleky.gov/ema.

- *Warning Systems*: Louisville Metro EMA manages and coordinates the Outdoor Warning System, which consists of over 120 Sirens in various locations around the Metro area. These devices are activated from the 24-hour 911 (MetroSafe) communication center with back-up activation capability at two communication centers. The system is tested monthly with weekly diagnostic tests performed silently and SOPs for the siren operation are developed and reviewed annually. Other warning systems located at the 24-hour warning point include Emergency Alert System (EAS), MetroCall, 1610 AM radio, TRIMARC Transportation System and the Cable Interrupt system. Warning systems that are monitored include the NOAA weather radio and several computer generated weather programs to keep a watchful eye on possible weather conditions that would affect Louisville Metro.

- *Facility Shelter Surveys/Disaster In-services-training:* This program coordinates several activities that assist various private/public schools, colleges/universities, businesses, churches, and community groups in planning for disasters. This process usually starts with a facility visit to conduct a survey, which will identify and designate potential shelter safe areas. After the initial survey, several documents that will assist the facility in building their own emergency plan are presented. Annual in-service training for all potential hazard events is practiced. Tornado and Shelter-in-Place training are the most widely requested topics for in-services.

- *The Louisville/Jefferson County Local Emergency Planning Committee* (LEPC) is responsible for developing the Community Response Plan, but implementation of the plan is the responsibility of local government as a means of protecting life and property. The LEPC has coordinated development of the plan with local officials and agency personnel who implement it for a hazardous material incident. This plan provides guidance for response to a hazardous materials release from a facility which manufactures, uses or stores such substances. Agency personnel who are likely to provide on-site support should develop detailed Standard Operations Procedures which reveal names and quantities of hazardous materials, include storage areas and manner of storage, identify adverse health and environmental effects of exposure to the chemicals, and provide specific operations procedures relating to the agency.

- *Hazardous Material Emergency Response*: The Emergency Management program supports the Hazardous Materials Program by participating in the on-call rotation, attending training, and responding, to chemical emergencies or other related events. The HazMat Training Program sponsors training for both the hazmat response community and LEPC personnel. Working in partnership with the Kentucky Emergency Response Commission, KyEM annually sponsors courses to support the OSHA training levels, such as Emergency Response Guidebook, Hazardous Materials Awareness, Hazardous Materials Operations, and NIMS 300/400 Compliance. KyEM works with a volunteer cadre of local Haz-Mat instructors along with paid instructors from the State's Fire/Rescue Training Program to deliver Haz-Mat Awareness and Operations training.

- *Chemical Stockpile Emergency Preparedness Program (CSEPP)*: In the unlikely event of a chemical agent, the planning process between the U.S. Army and FEMA assists state and local governments in improving emergency planning and preparedness in communities near chemical weapons storage sites in their community. This CSEPP process requires coordination of local military and civilian efforts and ensures that decisions will be made and carried out effectively in a crisis.

- *Healthcare Emergency Response Association (HERA)*: The mission of HERA Region 6 preparedness committee is to support the development of cooperative partnerships in order to promote and enhance the disaster preparedness of the community's healthcare and emergency response system(s) through coordinated disaster preparedness, education, public outreach, and response and recovery activities. HERA has created an All Hazards Plan, which helps hospitals during disasters; additionally all HERA hospitals have signed the Kentucky Hospital Association Mutual Aid Compact, which is a mutual aid agreement for all hospitals throughout the Commonwealth.

- *Metropolitan Medical Response System (MMRS)*: The MMRS is an ongoing effort by the public health and safety community in Louisville Metro to plan for serious health and medical catastrophes that threaten public health (terrorism, epidemics, etc.), to develop systems for coordinating and providing critical care where it is needed and to purchase medicine and equipment. Louisville Metro EMA has joined with agencies throughout Bullitt, Henry, Jefferson, Oldham, Shelby, Spencer and Trimble counties in Kentucky and Clark and Floyd counties in southern Indiana to effectively respond to disasters.

- *Terrorism & Weapons of Mass Destruction*: Louisville Metro EMA staff has received training for any event that might disrupt normal daily activities, such as terrorism or the use of a weapon of mass destruction. Louisville Metro EMA attends regularly scheduled training sessions and response is incorporated into the EOP.

- *National Defense Medical System (NDMS)*: The NDMS is designed to care for the victims of an incident, like 9-11, that exceeds the medical care capability of an affected state, region, or federal medical care system. NDMS plans for treating large numbers of casualties in a major peacetime disaster or national security emergency involving a conventional military conflict. The Emergency Management program is responsible for coordinating efforts with local hospitals, the Department of Defense, FEMA, the Veterans Administration, and Health and Human Services in the event of the activation of this system.

  NDMS is capable of treating large numbers of casualties injured in a major peacetime disaster or a national security emergency involving a conventional military conflict. The NDMS fulfills three main objectives:

  1. Provide supplemental health and medical assistance in domestic disasters at the request of state and local authorities.
  2. Evacuate patients who cannot be cared for in the disaster area to designated locations elsewhere in the nation.

3. Provide hospitalization in a national network of hospitals to care for the victims of a domestic disaster or military contingency that exceeds the medical care capability of the affected local, state, or federal medical system.

- *Louisville Medical Reserve Corps (MRC)* has trained over 1,200 volunteers. The MRC is comprised of medical and non-medical people who are willing to volunteer their time and expertise to supplement existing public health and local resources during times of emergencies and community need. The Louisville MRC has once again been selected to receive a capacity building grant from the National Association of County and City Health Officials (NACCHO). The grant will be utilized to recruit and train new MRC volunteers.

  Since 2008, MRC volunteers have assisted the Louisville Metro Department of Public Health & Wellness in staffing special needs shelters when Louisville Metro hosted the Hurricane Gustav evacuees, during the 2008 windstorm and during the 2009 ice storm. They also assisted during the H1N1 vaccination campaign in 2009 and assisted with the vaccination of Jefferson County Public School (JCPS) students at sites where 80% of the students qualify for free or reduced lunches in 2010.

  In March 2011, the Kentucky Department for Public Health offered a free workshop to provide training for volunteers interested in offering assistance during public health emergencies. This exciting event will provide new MRC volunteers an opportunity to complete all of the training required to join the MRC in one day. Over three hundred people registered for the event.

Grant applications: Louisville Metro has taken advantage of several opportunities to garner federal money in a post-disaster setting. As a result, acquisitions have taken place all over the county. FEMA Grant application projects types vary by 3 categories, e.g., Planning, Initiative, and Projects (i.e., Construction, Drainage, and Acquisition/Demolition). Submitted Letter of Intents (LOI) are prioritized by KyEM as to whether or not the project is located in an affected disaster area. If so, the project does take precedence over counties that were not in the designated disaster area. Louisville Metro has been in the declared area for the last 3 Kentucky disasters. Following is a profile of existing grant applications.

Mitigation Grant Profiles

Underway—

- Multi-Hazard Mitigation 5 Year Plan Update, Legislative PDM, $266,666
- Harrods Creek Soil Stabilization/The Landings at Harrods Creek, HMGP, $853,000
- Local Energy Assurance Plan (LEAP), USDE, $300,000

HMGP Awarded—

- Generators: 8 Louisville Metro Police Dept (LMPD) sites and 3 Louisville Fire Dept. (LFD) sites, $800,000
- First Floor Elevations for 300 Repetitive Loss Structures, $25,675
- Buy-Out/Demolition: Seatonville Road, $583,000

Awaiting Review and Approval—

- Buy-Out/Demolition: 4 Phases/128 properties Maple St. area, HMGP, $10 Million
- Buy-Out/Demolition: Algonquin Meadows, 26 properties, HMGP, $1,980,000
- Buy-Out/Demolition: Belquin Neighborhood, 43 properties, HMGP, $3,180,000
- Buy-Out/Demolition: Transylvania Neighborhood, 8 properties, HMGP, $960,000
- Buy-Out/Demolition: Wewoka/West Park, 48 properties, HMGP, $3,760,000
- Data Collection – 1,000 Public Buildings, as essential facilities inventories, HMGP, $85,000
- Data Collection: Dam/Levee Inventories, HMGP, $56,000
- Data Collection: Updated Soils Data & Classifications, HMGP, $37,000.
- Outdoor Warning Sirens: one additional, and replace three existing Outdoor Warning Sirens, HMGP, $90,600
- Generator: Jeffersontown Fire District, HMGP, $88,400
- Generator: Prospect City Hall/Police Station, HMGP, $80,000

4.4.1.3 Mitigation Success Stories

Louisville Metro has been very successful to-date with mitigation activities, including regulatory and legislation actions. The annual progress report details any project revisions, updates and successes and revises the five-year Plan accordingly.

Below is a summary of the projects that identifies the completed or deleted actions and projects from the previously approved 2005 Plan as a benchmark for progress. The remaining projects in the 2005 Plan are considered deferred projects and actions and were incorporated into the current five-year action plan and are described later in this section.

Completed Project Highlights by Hazard

<u>Flood Hazard</u>

- **D-FIRMS**. On November 9, 2006, the Louisville Metro Council adopted revised floodplain regulations. The revised ordinance officially adopted the new D-FIRM (Digital-Flood Insurance Rate Maps), which became official on December 5, 2006.
- **FMA Approved Plan**. Louisville submitted the Floodplain Management Plan for approval as a FMA plan. FEMA approved the plan which means Louisville can apply for FMA grant funding for flood-related repetitive loss properties.
- **Floodplain Management Training Modules**. Comprehensive Floodplain Management Training modules were completed and training was given to MSD staff, Floodplain Board, government staff, and related audiences. The modules are stand-alone and ready for future training.

<u>Karst Hazard</u>. **Local Karst Regulations.** Karst regulations were developed and adopted by Louisville Metro Council and is now part of the LDC. Metro PDS is the designated agency to report and receive data for karst/sinkhole locations indicated on development plans per new

karst regulations. LOJIC and PDS mapped local karst, incorporated into Cornerstone 2020 graphics, and developed an interactive web-based query to provide site-specific determination of karst potential at http://www.lojic.org/standard/viewer.htm. Upon entering an address, the query provides spatial data relative to steep slopes and karst potential. Training for the karst regulations was provided countywide to inform and educate the development community on the new development code.

Landslide Hazard. Landslide areas in Kenwood Hills were down-zoned to limit development in Spring 2007. The Louisville Metro Planning Commission endorsed zoning changes that would limit future development on Kenwood Hill and in the area around the bottom of the hill. Called "downzonings", the proposed changes would affect much of the 336.6-acre area bounded by West Kenwood Drive, Third Street, Seneca Trail, Southside Drive, and Palatka and New Cut Roads.

Wind / Storm Driven Hazards.

- **Interactive Tornado Map**. NWS developed an interactive website that shows the path of historical tornadoes. www.crh.noaa.gov/lmk/?n=tornado_climatology_cwfa
- **2007 Kentucky Residential Code**. New regulations to strengthen the connection between the roof and walls of new construction which increases the building's resistance to wind/tornado hazards. This change to Chapter 8 of the Residential Code was approved by the Kentucky Board of Housing & Building Construction and adopted in July 2007.
- **Siren Video**. LEPC funded a 15-minute Outdoor Warning Siren CD/Video
- **Pre and Post-Disaster Standard Messages and education strategy.** EMA placed new transmission towers for 1610 AM radio for highway and severe weather notification. TriMarc disseminates Tornado Warnings via NWS and issues severe weather warnings by announcing drivers to tune to 530AM radio.

LG& E Projects:

- **Tree trimming and power line maintenance.** LG& E developed Pro-Active plans to be utilized before severe weather, including a trim cycle for trees near power lines. LG&E also developed Preventive Tree Maintenance Outreach to property owners and disseminated via LG&E bill stuffers.
- **Storm Central Outage Map.** At http://www.lge-ku.com/storm/aboutmap.asp. The innovative outage map uses color-coded symbols to indicate the number and location of customers without power in the service area and a Legend explains how the color-coded outage symbols indicate the number and location of customers without service. Customers can enter a specific address, town and state, or ZIP code for site specific information.

2005 Plan Deleted Projects

- **Woodland Manor Basin Project –** This project involved the construction of a 38 acre-feet basin at the confluence of Fishpool Creek and Southern Ditch in the Pond Creek Watershed. The basin was intended to benefit local roads and residential properties in

the Woodland Manor area that are particularly susceptible to frequent flood damage. During 2008, the project was determined to be not cost-effective and was cancelled.

- **Develop Cellular phone service emergency warnings –** this project involved sending mass text messages for emergency warnings. A second action was to inform the public about the availability of this service by their provider (EMA). After research of other communities who have already implemented, it was determined the project was cost-prohibitive for EMA to provide service and was cancelled. Additionally, NWS as well as many news media outlets now offer this service.

4.4.2 Revising the Mitigation Strategy

The Mitigation Strategy utilizes the Risk Matrix as the foundation for developing a local plan. Project Staff assisted in the design and development of the Mitigation Strategy through a tier of meetings and coordination. During this phase of the planning process, the Plan Development Team identified, evaluated, and analyzed a comprehensive range of specific mitigation actions being considered. These actions are based on the evaluation of the risk assessment and in compliance with the mitigation goals and objectives outlined in the next subsection.

RISK	HAZARDS
Severe Risk Hazards	Dam Failure Flood Haz/Mat Severe Storm Severe Winter Storm Tornado
High Risk Hazards	Hail Karst/Sinkhole
Moderate Risk Hazards	Drought Earthquake Extreme Heat Landslide Wildfire

During the September 15, 2010 meeting, the Advisory Committee received 13 “hazard fact sheets” and relative hazard exposure maps for each hazard. The fact sheets were used to help determine the best goals, objectives, mitigation programs, and projects for the Action Plan. In addition to the presentations, the hazard fact sheets provided the Advisory Committee with tools to make wise decisions for mitigation projects.

Mitigation Strategy 2010/11 Schedule

- **September 15, 2010** Begin Mitigation Strategy
  - Review Draft Fact Sheets.
  - Presentations from all hazard representatives.
- **October 19**
  - Continue presentations from all hazard representatives.
  - Review Capability Assessment.
  - Introduce 2005 Goals and Objectives for review.
  - Subcommittees to brainstorm concerns/problems.
- **November 16** Develop Mitigation Strategy
  - Action Plan/ Subcommittees
  - Approve revised Goals and Objectives
  - Using STAPLEE criteria
  - Funding & Technical Assistance
  - Priorities & Goals
- **February 16, 2011** finalizing Action Plans

4.4.2.1 Updating the Louisville Metro Multi-Hazard Mitigation Goals and Objectives

During the October 19, 2010 meeting, Project Staff presented the 2005 goals and objectives for input from the Advisory Committee. The only update recommended to the 2005 Goals was to include a multi-hazard approach throughout the goals and objectives.

Louisville Metro’s planning process otherwise took an extra step to identify objectives that more narrowly define implementation steps to attain the goals. The revised Goals and Objectives were approved in the November 16 Advisory Committee meeting.

Goal 1—Minimize the loss of life and injuries that could be caused by multi-hazards.

- Objective 1.1—Promote the use of early-warning systems to alert people in multiple languages of severe weather, such as thunderstorms, floods, and tornadoes.
- Objective 1.2—Encourage the development or amendment of laws so they may more effectively address hazard mitigation.
- Objective 1.3—Ensure building codes addressing the construction of engineered and residential structures are properly enforced.
- Objective 1.4—Improve the safety of high-hazard dams to minimize the threat to people and structures that would be impacted by their failure.
- Objective 1.5—Make existing manufactured housing more resistant to movement from their sites by high winds and swift floodwaters.
- Objective 1.6—Promote the installation of tornado safe rooms in homes and construction of community tornado shelters.
- Objective 1.7—Reduce repetitive losses, especially those caused by flooding.
- Objective 1.8—Continue to conduct studies assessing flood hazards and risks.

Mitigation Goals and Objectives

Mitigation Goals are designed to be general guidelines of what is to be achieved. These goals are for long-term and represent the overall vision of the mitigation plan.

The **Objectives** define the strategies and implementation steps to attain the identified goals. These objectives are specific, measurable, and have a defined completion.

Goal 2—Facilitate a sustainable economy by protecting agriculture, business, and other economic activities from multi-hazards.

- Objective 2.1—Reduce the vulnerabilities of Louisville Metro owned facilities and infrastructure to natural hazards.
- Objective 2.2—Reduce the vulnerability of Louisville Metro's structures and infrastructure to the effects of geologic hazards including landslides, earthquakes, and sinkhole collapse.
- Objective 2.3—Provide incentives for mitigation planning and actions.
- Objective 2.4—Support efforts that will assist with the continuity of critical business operations.
- Objective 2.5—Develop hazard mitigation policies that promote the protection of the environment.
- Objective 2.5—Direct urban growth away from flood hazard areas.

Louisville Metro Multi-Hazard Mitigation Goals

- **Goal 1**—Minimize the loss of life and injuries that could be caused by multi-hazards.
- **Goal 2**—Facilitate a sustainable economy by protecting agriculture, business, and other economic activities from multi-hazards.
- **Goal 3**—Facilitate the strengthening of public emergency services, its infrastructure, facilities, equipment, and personnel to multi-hazards.
- **Goal 4**—Develop a community-wide mitigation effort by building stronger partnerships between government, businesses, and the general public.
- **Goal 5**—Increase public and private understanding of multi-hazard mitigation through the promotion of mitigation education and awareness of natural hazards.
- **Goal 6**—Enhance existing or design new policies and technical capabilities that will reduce the effects of multi-hazards.
- **Goal 7**—Enhance existing technical and GIS data and capabilities that will reduce the effects of multi-hazards.

Goal 3—Facilitate the strengthening of public emergency services, its infrastructure, facilities, equipment, and personnel to multi-hazards.

- Objective 3.1—Integrate the local pre- and post disaster mitigation functions with the response and recovery functions of the state.
- Objective 3.2—Assist where possible to include mitigation activity in emergency responder training.
- Objective 3.3—Utilize non-traditional organizations (E.g., Boy scouts, churches, etc.) to provide training to a broader constituency.
- Objective 3.4 – Strengthen relationships and program coordination with suburban cities. (Small city grant development).
- Objective 3.5—Promotion of education of hazmat activities

Goal 4—Develop a community-wide mitigation effort by building stronger partnerships between government, businesses, and the general public.

- Objective 4.1—Form partnerships to leverage and share resources.
- Objective 4.2—Annually review existing local agency programs, plans, and policies to determine their effectiveness and efficiency in reducing risk and vulnerabilities to natural hazards.

Goal 5—Increase public and private understanding of multi-hazard mitigation through the promotion of mitigation education and awareness of multi-hazards.

- Objective 5.1—Disseminate useful information about Louisville Metro's geologic multi-hazards to the general public and development professionals in order to assist in safe, appropriate development, particularly in hazard areas.
- Objective 5.2—Improve public knowledge of hazards and protective measures so individuals can appropriately respond during hazard events.
- Objective 5.3—As resources allow, develop, and promote outreach strategies designed to educate residents and businesses about local hazards, their associated risk and vulnerabilities, and the applicable mitigation actions.
- Objective 5.4—Identify and encourage the incorporation of available hazard mitigation education and outreach programs/products into school education programs.
- Objective 5.5—As resources allow, maintain an ongoing education and outreach effort to educate local officials about the importance of hazard mitigation.
- Objective 5.6—As resources permit, develop a public awareness campaign on the benefits of pre- and post-disaster mitigation.
- Objective 5.7—Develop a strategy for working with the print, electronic and broadcast media to disseminate mitigation education and outreach material.

Goal 6—Enhance existing or design new policies and technical capabilities that will reduce the effects of multi-hazards.

- Objective 6.1—Increase the community's involvement in the CRS program. This will promote better floodplain management while offering the incentive of lower flood insurance premiums.

- Objective 6.2—Promote the gathering and archiving of local data on the types and amount of damages after a natural hazard event.
- Objective 6.3—Support the development and use of disaster loss reduction related building codes and standards designed to reduce vulnerability and risk to all hazards.

Goal 7—Enhance existing technical and GIS data and capabilities that will reduce the effects of multi-hazards.

- Objective 7.1—Improve hazard information, including databases and maps.
- Objective 7.2—Review and recommend annual updates of the risk and vulnerability assessments of Louisville Metro's Hazard Mitigation Plan.

4.4.3 Developing Identification and Analysis of Mitigation Measures

4.4.3.1 Six General Mitigation Strategies

Prior to analyzing and prioritizing mitigation actions, it was useful for the Advisory Committee to sort identified mitigation actions into the following groups:

Identification and Analysis of Mitigation Measures

Requirement §201.6(c)(3)(ii): The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

1. **Preventive** activities keep problems from getting worse. Land use and development of hazard areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices. Preventive measures are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial.
2. **Property protection** activities are usually undertaken by property owners on a building-by-building or parcel basis. Property protection measures protect existing structures by modifying the building to withstand hazardous events, or removing structures from hazardous locations.
3. **Structural projects** are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event and are usually designed by engineers.
4. **Natural resource protection** activities preserve or restore natural areas or the natural functions of floodplain and watershed areas. They are usually implemented by parks, recreation, or conservation agencies or organizations.
5. **Emergency services** measures are taken during an emergency to minimize its impact. These measures often are the responsibility of emergency management responders and staff and the owners or operators of major or critical facilities.
6. **Public information and awareness** activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.

The following table was presented to the Advisory Committee and outlines various projects relative to the six strategies for projects and measures. This info assisted in formulating the Mitigation Strategy and outlining specific projects.

GENERAL MITIGATION STRATEGIES, PROJECTS AND MEASURES		
Regulations & Preventive Measures ➢ Planning and zoning ➢ Permit process & Code Enforcement ➢ Stormwater management activities ➢ Drainage and stream system maintenance ➢ International, State & Local Building codes ➢ Development and Land Use ➢ Regulations/Ordinances/Standards (e.g. Floodplain, Haz-Mat, & Sediment Control, Health) ➢ Mapping & GIS ➢ Hazard disclosure ➢ Capital improvements programming ➢ Riverine / fault zone setbacks	**Property Protection & Structural Projects** ➢ Acquisitions & grants ➢ Retrofitting (i.e. windproofing, floodproofing, seismic design standards, sewer backup protection) ➢ Reservoirs, dams, levees, retaining walls ➢ Detention & retentions basins ➢ Best management practices ➢ Capital improvement projects ➢ Channel modifications ➢ Building elevation or relocation ➢ Critical facilities protection ➢ Insurance ➢ Safe rooms	**Emergency Services** ➢ Warning systems ➢ Emergency response ➢ Disaster assistance ➢ Critical facilities protection ➢ Health & safety during an emergency ➢ Evacuation planning and management ➢ Socially vulnerable population ➢ Sandbagging for flood protection ➢ Evacuation planning and management
Natural Resource Protection ➢ Open space & wetlands protection and preservation ➢ Greenways projects ➢ Erosion and sediment control ➢ Water quality ➢ Cornerstone 2020 land use ➢ Riparian buffers ➢ Stream restoration ➢ Fire resistant landscaping ➢ Slope stabilization	**Public Outreach & Information** ➢ Disseminating mapping and hazard information ➢ Hazard education via schools ➢ Health & Safety ➢ Greenways projects ➢ Environmental education ➢ Technical assistance / Training ➢ Neighborhood meetings; Speaker series ➢ Real estate hazard disclosure ➢ Hazard expositions ➢ Library materials	

4.4.3.2 Hazard Categories and Advisory Committee Subcommittees

As mentioned, Project Staff setup a tier of meetings and coordination to develop a holistic and comprehensive Mitigation Strategy and Action Plan given Louisville's hazards, vulnerabilities, and resources. Three subcommittees were formed under the types of hazard categories, as can be seen in the box to the right.

Following is a list of Subcommittee Members according to three hazard types.

Types	Hazards
Water Hazards	▸ Flood ▸ Dam / Levee Failure
Wind & Haz-Mat Hazards	▸ All Hazards category ▸ Haz/Mat ▸ Severe Winter Storms ▸ Wind / Storm Driven Hazards: · Hailstorm · Tornado · Severe Thunderstorms
Weather, Soils & Geological Hazards	▸ Drought ▸ Earthquake ▸ Extreme Heat ▸ Karst / Sinkhole ▸ Landslides ▸ Wildfire

Types	Hazards	Subcommittee Members	Facilitators
Water Hazards	▸ Flood ▸ Dam / Levee Failure	Bob Holt (citizen) Carey Johnson (KDOW) David Sweazy & Mike Keeling (Churchill Downs Racetrack) Dennis Sullivan (U of L) Dirk Gowin (PW) Donnie Hardin & Matthew Meunier (J-Town) Gregory Long (Ford Louisville Assembly) Jarrett Haley (KIPDA) Jim Birch & Jack Ruf (St. Matthews) Jimmy Stahl (URS) John Hamilton (Metro Parks) Justin Gray (MSD) Mike Callahan (NWS) Mike Dossett (KyEM Area 6) Mike Griffin (USGS) Richard Pruitt & Andy Lowe (USACE) Roy Flynn, MSD Steve French & Mark Adcock (Jewish Hospital & St. Mary Elizabeth Healthcare) Susan Barto (citizen)	Bob Smith David Johnson
Wind & Haz-Mat Hazards	▸ All Hazards category ▸ Haz/Mat ▸ Severe Winter Storms ▸ Wind / Storm Driven Hazards: · Hailstorm · Tornado · Severe Thunderstorms	Andy Tefertiller (UPS) Barbara Hall & Michael Pettit (Kentucky Truck Plant) Bill Farrell & David Rednour (Norton Healthcare) Bill Kessler (TARC) Bill Wetter & Steve Hosch (Health Dept) Brad Learn (Kentucky Department of Public Health) Chuck Fleischer (JCPS) David Guy & Keith Alexander (LG&E) Glen Powell (Metro United Way, 211) Graham Honaker (citizen) Janine Brown (ARC) Jim Bottom (EMA Haz-Mat) Jim Garrett (KYEM) John Gordon (NWS) Karen Scott & Steve Petty (Louisville Regional Airport Authority) Lisa Gaus & Gerard Kohler (MSD Haz-Mat) Marc Miller (Baptist East Hospital) Marcy Heilman Bishop (EMA) Marilyn Givan (MetroCall) Michael Brandon (LMPD) Michele Redmon (citizen) Paul Freibert (University of Louisville Hospital) Rick Roller & Roger Parvin (EMS) Rocky Pusateri & Chuck Kavanaugh (HBAL) Shane Corbin & DJ Fountain (Air Pollution Control Board) Tim Shockley (HOSPRUS) Tom VanCader (Spalding University)	Jim McKinney Lori Rafferty Josh Human
Weather, Soils & Geological Hazards	▸ Drought ▸ Earthquake ▸ Extreme Heat ▸ Karst / Sinkhole ▸ Landslides ▸ Wildfire	Alice McKinley (Anchorage) Arealia Denby (Samaritan Global) Betty Younis (PW) Chris Dickinson (AMEC) Coy Webb (Southern Baptist KY Disaster Relief) Dawn Warrick (PDS) Doug Recktenwald (LMFD) Drew Andrews (KGS) Ethan Howard (Downtown Development) Glen Mudd (LWC) Jay Mickle (PVA) Joe Johnson (Suburban Fire) Joe Sullivan (NWS) Lance Sterling Edwards (Bellarmine University) Robert Kirchdorfer (IPL C & R)	Curt Bynum Jon Henney

4.4.3.3 Brainstorming an Action Plan

The Advisory Committee met in three subcommittees to brainstorm a draft Action Plan, consider cost/benefits, prioritize projects, and set an implementation timeline and standard. During the work sessions, subcommittee members reviewed projects relevant to their mitigation topics and focused on existing and future infrastructure.

During the October 19, 2010 meeting, the Advisory Committee met in subcommittees to discuss general problems, concerns, and specific activities to mitigate the hazards to reduce or avoid long-term vulnerabilities. The Advisory Committee voiced various concerns, problems, and ideas for all 13 hazards. Many of the problems, concerns, and project ideas are similar to the 2005 Plan. The Brainstorming session is detailed in Appendix 4.3.

From these general concerns, problems and concerns, Project Staff drafted a first cut at an Action Plan which was submitted to the Advisory Committee for refinement at the next Advisory Committee meeting. Some of the mitigation actions initially identified in the brainstorming sessions were ultimately eliminated in the action plan due to existing programs and legislation or due to limited capabilities, prohibitive costs, low benefit/cost ratio, or other concerns as described in the following subsection.

4.4.4 Mitigation Prioritization

4.4.4.1 STAPLEE Criteria Explanation

With regard to analyzing mitigation actions, the Development Team used FEMA's *Developing the Mitigation Plan* (FEMA 386-3) that highlights the STAPLEE method—a technique for identifying, evaluating, and prioritizing mitigation actions based on existing local conditions.

To refine the Action Plan, an analysis focused on several key areas, such as, engineering, technical, legal, environmental, social, and political feasibility. Using the STAPLEE criteria the Plan Development Team weighed the pros and cons of implementing a particular mitigation action.

The STAPLEE method was used to evaluate potential actions for the mitigation strategy and also to prioritize those that the Advisory Committee selected as mitigation actions. This prioritization of mitigation actions, allowed the Development Team to consider the benefits that results from the mitigation actions versus the cost of those actions.

The STAPLEE method is described in the table below.

Implementation of Mitigation Actions

Requirement §201.6(c)(3)(iii): The mitigation strategy section shall include an action plan describing how the actions identified will be prioritized, implemented, and administered by the local jurisdiction.

Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

STAPLEE Criteria	S Social		T Technical			A Administrative			P Political			L Legal			E Economic				E Environmental				
Considerations for Actions	Community Acceptance	Effect on Segment of Population	Technical Feasibility	Long-term Solution	Secondary Impacts	Staffing	Funding Allocated	Maintenance/ Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land/water	Effect on Endangered Species	Effect on HAZMAT/Waste Sites	Consistent with Community Environmental Goals	Consistent with Federal Laws

S – Social Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the community's social and cultural values.

T – Technical Mitigation actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.

A – Administrative Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.

P – Political Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support for the action.

L – Legal It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.

E – Economic Budget constraints can significantly deter the implementation of mitigation actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost benefit review, and possible to fund.

E – Environmental Sustainable mitigation actions that do not have an adverse effect on the environment, that comply with Federal, State, and local environmental regulations, and that are consistent with the community's environmental goals, have mitigation benefits while being environmentally sound.

4.4.4.2 Implementation of Mitigation Measures

As identified throughout this section, the Development Team was cognizant of identifying and evaluating mitigation actions, using the following considerations:

- 2010 State Hazard Mitigation Plan
- Compatibility with revised goals and objectives
- Cost/benefit reviews of potential actions
- Identified funding priorities
- Compatibility with other local or regional plans and programs.

Prioritization

Mitigation action prioritization emphasizes the extent to which benefits are maximized, according to a cost benefit review of the proposed projects and their associated costs.

As outlined earlier, the Plan Development Team reviewed the State and Local Capability Assessments to assess local existing and planned capabilities to implement the identified mitigation actions. In addition, the Local Capability Assessment outlines existing mitigation activities in the community, existing regulatory standards, projects that have already been planned, integration with comprehensive planning and capital improvement programs, as well as the Louisville Metro's ability to expand on and improve these existing tools.

Through the prioritization table, a cost-benefit analysis was completed whereby, the higher the action's priority, the more cost beneficial the action was determined to be for the community. The Advisory Committees used a scoring system of: High, Medium, and Low. The cost-benefit criteria used to prioritize each action included A, B and C as follows:

A. Permanently eliminate or reduce across a wide area
B. Alerts and educates the public
C. Permanently or significantly reduce in a specified or limited area

Priority	Description of Mitigation
A High	**Permanently eliminate or reduce across a wide area** Priority A projects or activities permanently eliminate damages or have a high probability of systematically reducing damages or deaths and injuries across a wide area from one or more of Louisville Metro's most significant hazards.
B Medium	**Alert and educate the public** Priority B projects, or activities, help alert the public to the approach of a threat from any of Louisville Metro's hazards, or educate the public about the need for disaster preparedness and mitigation.
C Low	**Permanently or significantly reduce in a specified or limited area** Priority C projects, or activities, permanently or significantly reduce the probability of damages, deaths and injuries in a specified or limited area from one of Louisville Metro's less significant hazards.

4.5 Louisville Metro's Final Five-Year Action Plan

The final five-year Action Plan includes how actions will be implemented and administered, including the department or agency responsible for carrying out the actions, the potential funding sources, and the implementation timeline. Projects and activities have detail that will ensure their success and often are described in a phased-approach.

For each hazard type and every project there is a table with the following header.

Hazard Type	Type of Activity or Project	Lead Implementer & Contact Person	Other Proposed Partners	Proposed Schedule	Funding/ Budget Considerations	Performance Measure	Priority	Matches Goals 1 - 7

Every project or activity in the Action Plan lists a lead implementer or personnel responsible for carrying out the actions, as well as partners. The Lead Implementer column lists a name of the contact person who will be able to report to the committees during the annual update and will be responsible for overseeing the project or activity. A schedule is imperative to keep projects on track.

For program funding/budget, the mitigation measures in the Action Plan are cost effective, environmentally sound, and technically feasible and the Action Plan prioritizes the measures based on these criteria. Many of the projects are grant dependent and as a result will rely on the grant process, approvals and resulting timeline. When possible, the projects include a cost estimate or budget. Many of the projects can be integrated into job descriptions or standard

operating procedures; in this case, the funding is a normal operational budget and is noted as NOB.

Each action also has a performance measure that can be determined by the completion of the project. The A, B, & C Priorities are listed as well as a column for Goals 1 - 7.

The final action plan addresses all 13 identified hazards. In addition, two general categories were added to include projects with multiple benefits for more than one hazard. A general category was created to encompass numerous projects that cover All Hazards. Another general category fits the Geological hazards for Earthquake, Karst/Sinkholes, and Landslide. These general categories merge several hazard actions into one project to allow one type of action to address multiple concerns where projects costs achieve the same benefit. Otherwise, the listed hazards and number of projects are specific to the 13 hazards that Louisville Metro is vulnerable to.

All Hazards Category	21 projects
Dam/Levee Failure	14 projects
Drought	2 projects
Earthquake	7 projects
Extreme Heat	3 projects
Flood	26 projects
Haz-Mat	3 projects
Geological: Earthquake, Karst/Sinkholes, Landslide	2 projects
Karst/Sinkhole	7 projects
Landslide	5 projects
Wildfire	6 projects
Wind/Storm Driven	7 projects
Winter/Storm	3 projects
	106 Projects

A first goal of the Plan Development Team is to update this Plan by capturing new data, especially in the area of GIS information. In general, the Advisory Committee anticipates the need to collect additional data on repetitive loss structures; details of future flood events including location and extent, and track the frequency of future events. Creating GIS information from the data collected will be an invaluable resource and may be expensive. As funding becomes available in the future, new data may be processed to enhance updates of this Plan.

See Appendix 4.4 for the final Five-Year Action Plan. The Louisville Metro Mitigation Five-Year Action Plan is being kept in Appendix 4.4 so that updating the actions will be easier and more efficient during the annual and five-year Plan Maintenance Procedures. The Actions will be reviewed and updated annually during the Advisory Committee review process and for the annual progress report.